PATENTS
16437-0208U
D115

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re The Application of:
Thomas John Ford et al.

Serial No.: 10/758,363

Filed: January 15, 2004

For: INERTIAL GPS NAVIGATION SYSTEM WITH MODIFIED KALMAN FILTER

Examiner: G. Issing

Art Unit: 3662

Cesari and McKenna, LLP
88 Black Falcon Avenue
Boston, MA 02210
April 26, 2006

"Express Mail" Mailing-Label Number: EV336704305US

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

RESPONSE

We have carefully considered the Office Action dated January 25, 2006, in which elected claims 7, 8 and 11-14 are rejected as anticipated by each of three cited references. Before discussing the references, we point out that, as set forth in independent claims 7 and 11, the INS Kalman filter of the current invention uses inertial measurements and delta phase measurements to **update and maintain current and previous position related information**. As discussed below, none of the cited references show such an INS Kalman filter, and thus, none of the references anticipate the invention as set forth in in-

dependent claims 7 and 11 and the claims that depend therefrom. Further, none of the references show a GPS subsystem in which a single GPS receiver produces delta phase measurements, which are double differenced across time and GPS satellites.

As set forth in the current application beginning at page 14, the GPS subsystem produces a delta phase measurement using measurements from a single GPS receiver by taking the difference of measurements taken at two different times with respect to the same satellite and double differencing the measurements across GPS satellites. The delta phase measurements thus represent a component of the position change at the GPS receiver.

In contrast, the system described in the Kim article uses multiple GPS receivers to determine double-difference GPS carrier phase measurements, which are measurements from two GPS receivers across two satellites. See, e.g. eqn. 5. In the Kim article the measurements are taken by a reference receiver and a user receiver, and the double-difference observation in the Kim system represents a component of the position vector between the reference and the user receivers. The same double-difference GPS carrier phase measurements are made by the system described in the cited Buchler reference, to represent a component of the position vector between receivers R1 and R2. See, Column 4, lines 22-31.

Both the Kim system and the Buchler system use the double-difference measurements in Kalman filters that update in a conventional manner, that is, that update using errors associated with a given time. See, e.g., Buchler, Col. 5, lines 4-8; Kim, page 526. Similarly, the system described in the Coatantiec reference updates the Kalman filter us-

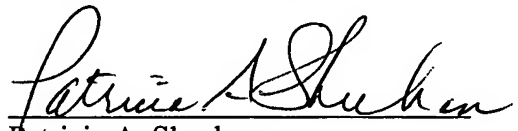
ing errors associated with a given time. See, e.g., paragraph 0061. In contrast, the INS Kalman filter of the current system uses delta phase measurements to observe position change over time, and thereby to limit the INS position error growth. As discussed in the application at pages 14-15, the INS Kalman filter is modified to use and maintain position information relating to both the previous and the current positions.

Accordingly, none of the cited references describe a system in which the Kalman filter is modified to use inertial and delta phase measurements to update and maintain current and previous position related information. Thus, none of the references anticipate the apparatus and method of independent claims 7 and 11 and the claims that depend therefrom. Further, such a modified Kalman filter is neither taught nor suggested by these references or the references cited as pertinent.

In light of the above, we ask that the Examiner reconsider his rejections of the currently pending claims and issue a Notice of Allowance for all pending claims.

Please charge any fee occasioned by this paper to our Deposit Account No. 03-1237.

Respectfully submitted,



Patricia A. Sheehan
Reg. No. 32,301
CESARI AND MCKENNA, LLP
88 Black Falcon Avenue
Boston, MA 02210-2414
(617) 951-2500